ENTOMOLOGY.[1]

SOME OBSERVATIONS ON THE MENTAL POWERS OF SPIDERS.—Under this title an important memoire is published by George W. and Elizabeth G. Peckham,[2] in which these observers detail numerous experiments upon the senses and mental powers of spiders. The following extracts will serve to indicate the scope of these experiments, and some of the conclusions deduced from them.

"Our experiments on the senses of smell in spiders extended over two summers. Many of them were performed by each of us separately, that we might detect the mistakes of the other. Our usual plan was to hold a slender glass rod, eight inches in length, in such a position that one end closely approached the spider, noting what effect, if any, was produced, and then to dip it into whatever scent we were using, hold it in the same position, and again note the effect. We tested them in this way while at rest in the web, while stalking their prey, while feigning death, and under various other conditions.

"The scents used were essential oils, cologne, and several kinds of perfumes. Acetic acid, vinegar, and like materials were avoided on account of their irritating action upon the integument.

"To sum up our work on the sense of smell, we made, in all, two hundred and twenty experiments. We found three species (*Argyroepeira hortorum*, *Dolomedes tenebrosus*, and *Herpyllus ecclesiasticus*) that did not respond to the tests. In all other cases it was evident that the scent was perceived by the spiders. This they showed in different ways,—by various movements of the legs, palpi and abdomen, by shaking their webs, by running away, by seizing the rod and binding it up with web as they would an insect, and in case of the Attidæ, by approaching the rod with the first legs and palpi held erect; but whether in the way of attacking it, or, as it sometimes seemed, because the smell was pleasant to them, it is impossible to say."

The most successful experiments upon the sense of hearing were conducted with tuning-forks. "These show that certain spiders indicate that they hear a vibrating tuning-fork by characteristic movements of the legs. Another set of spiders, however, manifest their perception of the sound in a different way. With these

[1] This department is edited by Prof. J. H. Comstock, Cornell University, Ithaca, N. Y., to whom communications, books for notice, etc., should be sent.

[2] Journal of Morphology, Vol. I., No. 2, pp. 383–419; also published separately by Ginn & Co., Boston.

the approach of a vibrating fork seemed to cause a greater alarm, making them drop from the web and keep out of sight for a longer or shorter time. However, after one of these spiders had been subjected to the experiment several times, it would, instead of dropping, raise its legs in the manner described above.

"A few experiments were made to determine where the organ of hearing was located, but we can offer nothing positive on this question. It seems probable that the auditory apparatus is but little specialized. Possibly it is spread over a considerable portion of the epidermis.

"We endeavored to estimate the strength of the maternal feeling in our spiders by removing their cocoons and then noting with what degree of eagerness they sought to regain them; and also by determining for how long a time they would remember the cocoons if they were separated from them.

"Notwithstanding many efforts, we never found a spider among the Lycosidæ that was constant in her affection for so long a time as forty-eight hours. A female of *Clubiona pallens* Hentz, however, remembered her eggs for this length of time, and when they were returned to her spun a web over them in the corner of the box in which they were placed. Of all the spiders that we experimented upon, the little *Theridium globosum* Hentz had the best memory for her cocoon. We took her from her web, and returned her to it after fifty-one hours. She at once went to the eggs and touched them with her legs. She then left them, to improve her house, every now and then running back to see if they were safe. After she had arranged her household to her satisfaction she settled down near them.

"Several species of Attidæ and Thomisidæ did not remember their cocoons for twenty-four hours; yet these spiders, although they do not carry the egg-sack around with them, remain near it for from fifteen to twenty days."

As bearing on the sense of sight, they state: "We have frequently, while feeding our captives, seen them stalk their prey at a distance of five inches; and we have repeatedly held the active jumping-spider, *Astia vittata*, on one finger, and allowed it to jump on to a finger of the other hand, gradually increasing the distance up to eight inches. As the distance increased the spider paused longer before springing, gathering its legs together to make a good ready.

"We have twice seen a male of this species chasing a female upon a table covered with jars, books and boxes. The female would leap rapidly from one object to another, or would dart over the edge of a book or a box so as to be out of sight. In this position she would remain quiet for a few minutes, and then, creeping to the edge, would peer over to see if the male were still pursuing

her. If he happened not to be hidden she would seem to see him, even when ten or twelve inches away, and would quickly draw back; but in case he was hidden behind some object, she would hurry off, seeming to think she had a chance to escape.

"The male, in the meantime, frequently lost sight of the female. He would then mount to the top of the box or jar upon which he found himself, and, raising his head, would take a comprehensive view of the surrounding objects. Here he would remain until he caught sight of the female,—which he often did at a distance of at least ten inches,—when he would at once leap rapidly after her.

"The ocelli of some spiders, then, enable them to see objects at a distance of at least ten inches."

In order to determine whether spiders have a color sense or not, experiments were tried upon species that were found during the day, running among dead leaves, or hiding under stones or wood. Cages were constructed, each consisting in part of blue, green, yellow and red glass. Spiders were placed in these cages, and the color of the glass beneath which they retreated and remained was noted. The relative positions of the colors were varied on the different experiments. It was found that in two hundred and thirty-seven trials the spiders chose the red one hundred and eighty-one times, the yellow thirty-two, the blue eleven, and the green thirteen. These experiments seem to be conclusive as to the existence of a color sense in certain spiders.

We have not space to quote the results of experiments upon feigning death by spiders, nor to repeat the accounts of mistakes of spiders.

MEETING OF THE ENTOMOLOGICAL CLUB OF THE A. A. A. S.—The next meeting of this club will occur at 9 A.M., August 15th, in the High School building at Cleveland, Ohio.

Owing to the central position of Cleveland, this will be very convenient for the entomologists of both Canada and the United States. We may, therefore, expect a large attendance and a very interesting meeting.

Those who expect to furnish papers should send the titles at once to the Secretary, Professor A. J. Cook, Agricultural College, Mich., so that they may be announced in the programme.

THE ENTOMOLOGICAL REPORTS OF DR. LE BARON.—Professor S. A. Forbes, Champaign, Ill., writes us as follows: "I have lately received from the family of Dr. Le Baron a supply of duplicates of his four reports as State Entomologist of Illinois, 1871–74, and wish to offer, through the AMERICAN NATURALIST, to send copies, on receipt of postage, to any one who may wish them to complete their series."